What is claimed is:

1. A method of baseband digital modulation for a data transmission system wherein a plurality of data symbols is transmitted over a transmission channel at a symbol rate; said method comprising the steps of:

generating a plurality of inphase (I) and quadrature (Q) components of symbols by mapping an input bit stream comprising a plurality of digital codewords into a QAM constellation;

bandlimiting, quantizing, interpolating, and pre-compensating said I and Q components of said digital signal for a sync (*sinx/x*) function amplitude roll off by utilizing a Polyphase filter at a baseband frequency;

converting said plurality of digital symbols into an analog signal by using a D/A converter in each said I and Q channels separately;

prefiltering by a lowpass analog antialiasing prefilter said I analog signal in said I channel, and said Q analog signal in said Q channel separately;

and

complexly combining said I component and said Q component of said analog signal by an (I/Q) modulator to generate a real analog RF signal at an interpolated sampling rate.

2. The method of claim 1, wherein said step of bandlimiting, interpolating, and pre-compensating said plurality of said symbols by utilizing said Polyphase filter in each said I and Q channels separately at baseband frequency further includes the step of:

interpolating at a sampling rate twice the symbol rate.

3. The method of claim 1, wherein said step of bandlimiting, interpolating, and pre-compensating said plurality of said symbols by utilizing said Polyphase filter in each said I and Q channels separately at baseband frequency further includes the step of:

interpolating at a sampling rate four times the symbol rate.

4. The method of claim 1, wherein said step of bandlimiting, interpolating, and pre-compensating said plurality of said symbols by utilizing said Polyphase filter in each said I and Q channels separately at baseband frequency further includes the step of:

interpolating at a sampling rate eight times the symbol rate.

5. The method of claim 1, wherein said step of bandlimiting, interpolating, and pre-compensating said plurality of said symbols by utilizing said Polyphase filter in each said I and Q channels separately at baseband frequency further includes the step of:

interpolating at a sampling rate N times the symbol rate, wherein N is an integer.

6. The method of claim 1, wherein said step of bandlimiting, quantizing, interpolating, and pre-compensating said I and Q components of said digital signal for said sync (*sinx/x*) function amplitude roll off further includes the step of:

introducing a predistortion correction error signal in each said I and Q channels separately in order to pre-compensate for a further compression by a High Power Amplifier (HPA).

7. The method of claim 6 further including the step of:

periodically re-calibrating for an analog drift of said I/Q amplitude imbalance, for an analog drift of said I/Q phase imbalance, and for an analog drift of said DC offset caused by changes in outside temperature, and caused by aging of electronic components.

8. A method of passband digital modulation for a data transmission system wherein a plurality of data symbols is transmitted over a transmission channel at a symbol rate; said method comprising the steps of:

generating a plurality of I and Q components of symbols by mapping an input bit stream comprising a plurality of digital codewords into a QAM constellation;

bandlimiting, quantizing, and interpolating said plurality of symbols by utilizing a Polyphase filter at a passband IF frequency;

pre-compensating said I and Q components of said digital signal having said IF carrier signal for a sync (*sinx/x*) function amplitude roll off caused by an output D/A converter by using a complex shaping filter;

upconverting said I and said Q components of the digital signal to a RF carrier via a digital complex multiplier and discarding said Q output component of said digital signal;

converting said I output component into an analog RF output signal using said output D/A converter;

and

filtering out images of said real output RF analog signal by using a lowpass analog reconstruction filter.

9. The method of claim 8, wherein said step of bandlimiting, quantizing, and interpolating said plurality of symbols at said passband IF frequency further includes the step of:

interpolating at a sampling rate four times the symbol rate, wherein said IF frequency is equal to a symbol rate frequency.

10. The method of claim 8, wherein said step of bandlimiting, quantizing, and interpolating said plurality of symbols at said passband IF frequency further includes the step of:

interpolating at a sampling rate eight times the symbol rate, wherein said IF frequency is twice a symbol rate frequency.

11. The method of claim 8, wherein said step of bandlimiting, quantizing, and interpolating said plurality of symbols at said passband IF frequency further includes the step of:

interpolating at a sampling rate equal to N times the symbol rate, wherein said IF frequency is equal to N/2 times a symbol rate frequency, wherein N is an integer.

12. The method of claim 8, wherein said step of bandlimiting, quantizing, and interpolating said plurality of symbols at said passband IF frequency further includes the step of:

introducing a predistortion correction error signal in each said I and Q channels separately in order to pre-compensate for a further compression by a High Power Amplifier (HPA).

13. The method of claim 8 further including the steps of:

compensating for I/Q amplitude imbalance by using an I/Q amplitude gain block in said I channel and by using an I/Q amplitude gain block in said Q channel;

compensating for I/Q phase imbalance by using a quadrature error complex multiplier in order to change a phase relationship between I and Q components;

and

compensating for a DC offset by adding an equal amount of opposite polarity DC offset in each said I and Q channels.

14. A method of baseband/passband digital modulation for a data transmission system wherein a plurality of data symbols is transmitted over a transmission channel at a symbol rate; said method comprising the steps of:

generating a plurality of I and Q components of symbols by mapping an input bit stream comprising a plurality of digital codewords into a QAM constellation;

selecting a passband or a baseband mode;

and

generating an analog output signal in said passband or baseband mode.

15. The method of claim 14, wherein said step of selecting said passband or said baseband mode further includes the step of:

selecting said passband or said baseband mode depending on said QAM constellation.

16. The method of claim 15, wherein said step of selecting said passband or said

baseband mode further includes the step of:

selecting said passband mode if said QAM constellation includes less than 64 QAM plant points, and selecting said baseband mode, if said QAM constellation includes more than 64 QAM plant points.

17. The method of claim 15, wherein said step of selecting said passband or said baseband mode further includes the step of:

if said QAM constellation includes less than 64 QAM plant points, initially selecting said passband mode until a D/A conversion speed reaches a maximum passband conversion speed, and until an output symbol rate reaches a maximum passband symbol output rate, and subsequently switching to said baseband mode in order to double said maximum passband conversion speed and to double said maximum passband symbol output rate.

18. The method of claim 14, wherein if said baseband mode is selected, said step of generating said analog output signal further includes the steps of:

converting said plurality of digital symbols into an analog signal by using a D/A converter in each said I and Q channels separately;

prefiltering by a lowpass analog antialiasing prefilter each said analog signal in each said I and Q channels separately;

and

complexly combining said I component and said Q component of said analog signal to generate a real analog RF signal at an interpolated sampling rate.

19. The method of claim 18, wherein in said baseband mode said step of

generating said analog output signal further includes the steps of:

complexly upconverting and combining said I and Q components of said digital signal to generate an analog RF signal at an interpolated sampling rate,

and

filtering out images of said real output RF analog signal by using a lowpass analog reconstruction filter.

20. The method of claim 14 said step of selecting said passband mode or said passband mode further including the following steps:

bandlimiting, quantizing, and interpolating said plurality of symbols by utilizing a Polyphase filter in each said I and Q channels separately at a passband IF frequency;

introducing a predistortion correction error signal in each said I and Q channels separately in order to pre-compensate for a further compression by a High Power Amplifier (HPA);

pre-compensating said I and Q components of said digital signal having said IF carrier signal for a sync (*sinx/x*) function amplitude roll off caused by an output D/A converter by using a complex shaping filter;

upconverting said I and said Q components of the digital signal to a RF carrier via a digital complex multiplier and discarding said Q output component of said digital signal;

converting said I output component into an analog RF output signal using said output D/A converter;

and

filtering out images of said real output RF analog signal by using a lowpass

analog reconstruction filter.

21. An apparatus for baseband digital modulation for a data transmission system wherein a plurality of data symbols is transmitted over a transmission channel at a symbol rate; said apparatus comprising:

a means for generating a plurality of inphase (I) and quadrature (Q) components of symbols by mapping an input bit stream comprising a plurality of digital codewords into a QAM constellation;

a means for bandlimiting, quantizing, interpolating, and pre-compensating said I and Q components of said digital signal for a sync (*sinx/x*) function amplitude roll off at a baseband frequency;

a means for converting said plurality of digital symbols into an analog signal;

a means for prefiltering said I analog signal in said I channel, and said Q analog signal in said Q channel separately;

and

a means for complexly combining said I component and said Q component of said analog signal to generate a real analog RF signal at an interpolated sampling rate.

22. The apparatus of claim 21, wherein said means for interpolating said I and Q components of said digital signal further includes:

a means for interpolating at a sampling rate four times the symbol rate.

23. The apparatus of claim 21, wherein said means for interpolating said I and Q

components of said digital signal further includes:

a means for interpolating at a sampling rate eight times the symbol rate.

24. The apparatus of claim 21, wherein said means for interpolating said I and Q components of said digital signal further includes:

a means for interpolating at a sampling rate equal to N times the symbol rate, wherein N is an integer.

25. The apparatus of claim 21, further including:

a means for pre-compensating for a further compression by a High Power Amplifier (HPA).

26. The apparatus of claim 21 further including:

a means for periodically re-calibrating for an analog drift of said I/Q amplitude imbalance, for an analog drift of said I/Q phase imbalance, and for an analog drift of said DC offset caused by changes in outside temperature, and caused by aging of electronic components.

27. An apparatus for passband digital modulation for a data transmission system wherein a plurality of data symbols is transmitted over a transmission channel at a symbol rate; said apparatus comprising:

a means for generating a plurality of I and Q components of symbols by mapping an input bit stream comprising a plurality of digital codewords into a QAM constellation;

a means for bandlimiting, quantizing, and interpolating said plurality of

symbols at a passband IF frequency;

a means for pre-compensating said I and Q components of said digital signal having said IF carrier signal for a sync (*sinx/x*) function amplitude roll off;

a means for upconverting said I and said Q components of the digital signal to a RF carrier;

a means for converting said I output component into an analog RF output signal;

and

a means for filtering out images of said real output RF analog signal;

28. The apparatus of claim 27, wherein said means for interpolating said plurality of symbols at said passband IF frequency further includes:

a means for interpolating at a sampling rate four times the symbol rate, wherein said IF frequency is equal to a symbol rate frequency.

29. The apparatus of claim 27, wherein said means for interpolating said plurality of symbols at said passband IF frequency further includes:

a means for interpolating at a sampling rate eight times the symbol rate, wherein said IF frequency is twice a symbol rate frequency.

30. The apparatus of claim 27, wherein said means for interpolating said plurality of symbols at said passband IF frequency further includes:

a means for interpolating at a sampling rate N times the symbol rate, wherein said IF frequency is equal to N/2 symbol rate frequency, N being an integer.

31. The apparatus of claim 27 further includi8ng:

a means for introducing a predistortion correction error signal in each said I and Q channels separately in order to pre-compensate for a further compression by a High Power Amplifier (HPA).

32. An apparatus for baseband/passband digital modulation for a data transmission system wherein a plurality of data symbols is transmitted over a transmission channel at a symbol rate; said apparatus comprising:

a means for generating a plurality of I and Q components of symbols by mapping an input bit stream comprising a plurality of digital codewords into a QAM constellation;

a means for selecting a passband or a baseband mode;

and

a means for generating an analog output signal in said passband or baseband mode.

33. The apparatus of claim 32, wherein said means for selecting said passband or said baseband mode further includes the following algorithm:

if said QAM constellation includes less than 64 QAM plant points, initially selecting said passband mode until a D/A conversion speed reaches a maximum passband conversion speed, and until an output symbol rate reaches a maximum passband symbol output rate, and subsequently switching to said baseband mode in order to double said maximum passband conversion speed and to double said maximum passband symbol output rate.